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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/647,163	08/21/2003	Hui-Ling Lou	MP0284	1606
7590 01/06/2009				
FISH & RICHARDSON 3300 DAIN RAUSCHER PLAZA 60 SOUTH SIXTH STREET MINNEAPOLIS, MN 55402			EXAMINER NGUYEN, HANH N	
			ART UNIT 2416	PAPER NUMBER
			MAIL DATE 01/06/2009	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/647,163

**Applicant(s)**

LOU ET AL.

**Examiner**

Hanh Nguyen

**Art Unit**

2416

**Period for Reply** -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 09 September 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-3, 5-27, 29-51, 53-75 and 77-104 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) See Continuation Sheet is/are rejected.
- 7) ☒ Claim(s) See Continuation Sheet is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

Continuation of Disposition of Claims: Claims rejected are 1-3,7-11,14,17-19, 22, 24-26, 31-35, 38,41-43, 46,48, 49, 50, 55-58, 62, 65-67,70, 72-74, 79-83,86, 89-91, 94-104.

Continuation of Disposition of Claims: Claims objected to are 5,6,12,13,15,16, 20,21,23,27,29,30,36,37,39,40,44,45,47,51,53,54,60,61,63,64,68-71,75,77,78,84,85,87,88,92,93 and 95.

## **DETAILED ACTION**

### ***Claim Objections***

Claim 2 is objected to because of the following informalities: a period "." Is located on line 2 after " by". Applicant is required to remove the period "." to avoid indefinite meaning in the claimed language.. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 101***

Claim 1 is rejected under 35 U.S.C 101 as not falling within one of the four statutory categories of invention. While the claims recite a series of steps or acts to be performed, a statutory "process" under 35 U.S.C 101 must (1) be tied to another statutory category (such as a particular apparatus), or (2) transform underlying subject matter ( such as article or material) to a different state or thing (Reference the May 15, 2008 memorandum issued by Deputy Commissioner for Patent Examining Policy, John J. Love, titled " Classification of 'Process' under 35 USC 101"). The instant claims neither transform underlying subject matter nor positively tie to another statutory category that accomplishes the claimed method steps, and therefore do not qualify as a statutory process.

Regarding claim 1, the claimed limitations do not include apparatuses or structures performing ssteps of performing a Fourier transform; deriving initial channel estimates; demodulating and decoding ; and updating the channel estimate. Applicant is required to amend the claimed limitations to includes apparatuses or structures performing the steps.

Claims 2, 3, 5-24, 97, 98 are also rejected because they depend on parent claim 1 respectively.

Claim 73 is rejected under 35 U.S.C. 101 because the claimed invention in claim 73 is directed to non-statutory subject matter because "information carrier" is defined in the specification as a tone/carrier ( see paragraph [0025], fig.1C; and the specification does not show what " a computer program product" comprises. Therefore, " a computer program product tangibly embodied in an information carrier" is not operative and lack utility and not statutory. Claims 74, 75, 77-96, 103, 104 are rejected because they depend on claims 73 respectively.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 2, 7, 9, 10, 18, 25, 26, 31, 33, 34, 41, 42, 49, 50, 55, 57, 58, 65, 66, 73, 74, 79, 81, 82, 89, 90 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ma et al. ( US Pat. 7,233,625) in view of Chuang ( US Pat. 7,099,413). In claims 1, 2, 17, 25, 26, 41, 49, 50, 65, 73, 74, 89, applicant defines in the fig.1C, paragraph [0025] that preamble 204 comprises a number of subcarriers, each subcarrier is training symbol having a sequence of known transmit signals used for training at the receiver. Therefore, examiner considers a training symbol as a training sequence.

Ma et al. discloses a method of obtaining channel estimates ( see abstract, channel estimation), comprising: receiving a preamble across a channel, the preamble including two or more training sequences ( see fig.7,col.6, lines 25-30 and col.5, lines 25-32; receiving at a receiver preamble which includes two training symbols 205); performing a Fourier transform of the training sequences ( see fig.7, col.7, lines 1-5, Fast fourier transform ( FFT) recovers original sequences of frequency domain sub-symbols); deriving initial channel estimates in the frequency domain with the received preamble and a stored preamble ( see fig.7, col.7, lines 8-13 and abstract; channel estimator 709 uses the detected sub-symbols/preamble and the known values of sub-symbols to estimate values of channel response vectors); receiving data symbols across the channel ( see fig.7, col.6, lines 25-35 and col.5, lines 40-45, receiving at a receiver RF signal comprising transmitted pair of identical training symbols); demodulating and decoding the data symbols ( see fig.7, col.6, line 65 to col.7, line 20; demodulator 705 removes unneeded cyclical extension of data extensions in data vectors and demodulates the data vectors; combination of demodulator 705, decoder 713 forms decoder 715 decoding the sub-symbols inputted from demodulator 705). Ma et al. does not disclose updating the channel estimate using the demodulated and decoded data symbols.

Since the claims do not specifically described how the claimed "updating the channel estimation" is performed, therefore, "updating the channel estimation" is broadly understood as" repeating the channel estimation" after demodulating, decoding the data symbols.

Chuang et al. discloses updating the channel estimate using the demodulated and decoded data symbols ( see fig.1A, col.2, lines 5-20; at receiver 140, transformed signal after being demodulated, decoded is fed back to channel estimator 165 which repeats the signal channel estimations, demodulations and decode). Therefore, it would have been obvious to one skilled in the art apply the teachings of Chuang et al. into Ma et al. to update the channel estimations using demodulated and decoded data symbol. The motivation is improve channel quality such as minimize error rate of received data symbol.

In claims 7, 31, 55, 79, Ma et al. discloses the channel is OFDM system (see col.3, lines 54-56 & fig.1 and fig.7, the system provides an OFDM signal).

IN claims 8, 32, 56, 80, Ma et al. discloses performing the Fourier transform to obtain a received preamble (see fig.7, col.7, lines 1-4; FFT recovers original sequences of sub-symbols), and wherein said deriving the initial channel estimates comprises deriving initial channel estimates in the frequency domain with the received preamble and the stored preamble (see fig.7, col.7, lines 8-13 and abstract; channel estimator 709 uses the detected sub-symbols/preamble and the known values of sub-symbols to estimate values of channel response vectors).

In claims 9, 33, 57, 81, Ma et al. discloses the preamble comprises a predetermined number of excited subcarriers and non-excited subcarriers ( see fig.3, col.5, lines 45-50; a preamble comprises a number of even subcarriers and odd subcarriers).

In claims 10, 34, 58, 82, Ma et al. discloses the preamble comprises excited subcarriers for subcarriers  $k = +/-2, +/-4... +/-100$  ( see fig.3, col.5, lines 45-50; a preamble comprises a number of even subcarriers).

In claims 14, 38, 62, 86, Ma et al. discloses two or more training sequences for correlation, wherein the two or more training sequences are identical ( see col.5, lines 42-50, a pair of identical training symbols is transmitted from transmitter ( see fig.1) to receiver shown in fig.7. Fig.7 discloses the received preamble is synchronized using sliding correlation).

IN claims 18, 42, 66, 90, Ma et al. does not disclose decoding data symbols using Viterbi algorithm. Chuang et al. discloses a receiver 140 receives multicarrier data streams, performs FFT 155, demodulates at demodulator 160 and decodes the data stream 180 using Viterbi at decoder 180 ( see col.2, lines 5-25 and fig.1A). Therefore, it would have been obvious to use the Viterbi decoder into Ma et al. 's invention to decode the OFDM signals using the Viterbi algorithm. The motivation is to retrieves for desired users.

In claims 97-104, Ma et al. does not disclose the method is performed in an IEEE 802.11a-compliant system. According to Wikipedia encyclopedia which indicates that OFDM is applied in 802.11a such as wireless LAN radio interface; WIMAX and HIPERLAN/2; and 802.16 such as wireless MAN/Fixed broadband wireless access and HIPERMAN. Therefore, it is a well-known in the art of Ma et al. that the OFDM receiver and transmitter is compliant to IEEE802.11a and 802.16.



Claims 19, 22, 24, 43, 46, 48, 67, 70, 72, 91, 94, 96 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ma et al. ( US Pat. 7,233,625) in view of Chuang ( US Pat. 7,099,413) in view of Gozzo ( US Pat. 5432816).

In claims 19, 22, 24, 43, 46, 48, 67, 70, 72, 91, 94, 96, Ma et al. does not disclose updating channel estimation using Kalman filtering, Least mean square filtering and exponential filtering. Gozzo discloses a least square channel estimator 90 ( see fig.1) using training signal to provide a channel estimate ( see abstract and 6, lines 50-55 and col.17, lines 62-67); A channel filter 20 which can be substituted by exponential filter (see col.6, lines 60-65); and Kalman filter ( see col.3, lines 20-27; Kalman filter equalizer estimates a binary input sequence transmitted over a dispersed channel). Therefore, it would have been obvious to one skilled in the art to combine the teachings of Gozzo with the invention of Ma et al. to update channel estimation by using different filtering algorithms depends on different environments.

Claims 11, 35, 59, 83 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ma et al. ( US Pat. 7,233,625) in view of Chuang ( US Pat. 7,099,413) in view of Kadous ( US Pat. 6996195 B2).

In claims 11, 35, 59, 83, Ma et al. does not disclose interpolating the channel estimates for unexcited subcarriers. Kadous discloses in fig.2, coefficient interpolator and channel estimator 60 receives least square channel estimates from decoupler 58 , and multiplies interpolation coefficient for each channel to obtain final channel estimator ( see col.5, lines 22-30). Therefore, it would have been obvious to one skilled in the art

to use the interpolator 60 into the invention of Ma et al. to interpolate channel estimate for odd/unexcited subcarriers.

***Allowable Subject Matter***

Claims 3, 5, 6, 12, 13, 15, 20, 21, 23, 27, 29, 30, 36, 37, 39, 40, 44, 45, 47, 51, 53, 54, 60, 61, 63, 64, 68, 69, 75, 77, 78, 84, 85, 87, 88, 92, 93, 95 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Cho et al. ( US Pat. 7068593 B2).

Belotserkovsky et al. ( US Paty. 6771591 B1).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hanh Nguyen whose telephone number is 571 272 3092. The examiner can normally be reached on Monday-Thursday from 8:30 to 4:30PM. The examiner can also be reached on alternate .

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Huy Vu, can be reached on 571 272 3155. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Hanh Nguyen/

Primary Examiner, Art Unit 2416.